J. Ethnobiol. 8(2):195-202 Winter 1988

THE UTILIZATION OF INSECTS IN THE EMPIRICAL MEDICINE OF ANCIENT MEXICANS

DRA. JULIETA RAMOS-ELORDUY DE CONCONI
M. EN C. JOSE MANUEL PINO MORENO
Instituto de Biologia
Universidad Nacional Autońoma de México
Apartado Postal 70-153
04510 México 20, D.F. CP. México

ABSTRACT.—Since early times humanity has been concerned with the medicinal properties of animals in its surroundings. With the passage of time, many animals along with their presumed medicinal attributes have been registered in various post-conquest historical writings, e.g., codices. Many species of insects form part of the materia medica of some Mexican cultures, in some cases have mystical and magical properties. To date we have noted 43 species of insects employed in traditional medicine as ointments, pomades, or infusions. They have also been prepared and applied, in various ways in order to alleviate such ailments as stomach distress, kidney and liver disorders, nervous breakdowns, and urogenital, inmunological, and glandular diseases.

INTRODUCTION

Since early times in Mexico, many species of insects, along with a large number of species of plants, have been recognized as possessing curative properties. The Aztecs and several other indigenous groups had knowledge of what might be termed ''medicinal insects'' (De Asis 1982; Meza 1979; Sahagun 1980). Many species of insects have played important roles in the mysticism and magic inherent in many Mexican cultures as well as in the treatment of a variety of illnesses. (Aguirre 1947; Clavijero 1980).

Knowledge of medicinal insects and their uses has persisted in many rural areas today, having been passed down from earlier practitioners of this healing art. Insects are sold in the markets of some towns and various insects parts are said to be useful as diuretics, analgesics, anaesthetics, aphrodisiacs, etc. Considering that the number of rural areas where this knowledge survives is reduced each year and that in some regions the diversity of insects is available only during certain seasons of the year, it is important to study the insects associated with the empirical medicine of past and contemporary Mexican cultures. We feel it is imperative to learn about and develop indigenous medicine since it utilizes almost exclusively natural products with minimal side effects.

MATERIALS AND METHODS

The majority of the insects mentioned in the present work are reported in the Florentine Codex (Sahagun 1980). Others are found in Hernandez (1959) and De Asis (1982). The insects in these historical sources were indentified by comparing their descriptions with the specimens deposited in the Scientific Collection of the Biology

Institute of the Universidad Nacional Autónoma de México (UNAM). Behavioral characteristics, nest type, location, and other details described in the codices are also considered. Since many of the descriptions in the codices were incomplete, we encountered some difficulty with this means of identification.

We solicited supplemental information and made collections of insects in the field among different cultures as Nahoas, Otomies, Mixtecos, Zapotecos, Mayas, Lacandones, Tarascos, Purepechas, Mazahuas, etc. in several states of Mexico. A number of people living in different rural communities were interviewed about the types of insects they used for medicinal purposes and how, when, for what illnesses or conditions preparations of these insects could aid in treatment. All specimens of insects collected were identified at the Laboratory of Entomology, Institute of Biology, UNAM. They were deposited in the Scientific Collection of the Institute of Biology, along with the collections of edible insects of Mexico.

RESULTS AND DISCUSSION

The 43 species of medicinal insects were identified, based upon the studies of the codices and field work. They belonged in 16 families in six orders and include grasshoppers, locusts, crickets, bugs, mealybugs, beetles, butterflies, ants, and bees. The number of insects per order varies from nine in the Hymenoptera (bees, wasps, and ants) to only three in the Lepidoptera (butterflies). Although, for the most part, insects were used in the adult stage, it must be mentioned that usually only certain parts of any given species of insect were considered efficacious and were employed in the medicinal preparation. In the case of bees, honey, the propolis, and royal jelly were all used.

In the following section, various insects will be discussed regarding parts used, preparation, administration, and illnesses treated. In many cases information recorded by other authors was verified by us in the field.

Grasshoppers, Sphenarium spp., Taenipoda sp. Melanoplus sp. (Orthoptera, Acrididae) ***(Chapolin** in Nahuatl).* The hind legs of grasshoppers were crushed and mixed with water, then drunk as a powerful diuretic to treat kidney diseases. The infusion, which is said to have refreshing properties, reduces swelling (De Asis 1982). Rural people in the State of Oaxaca today use grasshoppers to treat certain intestinal disorders.

Locusts, Schistocerca spp. These insects were pulverized and eaten as a dietary supplement to alleviate nutritional deficiencies (FAO 1973) and to fortify the blood. It was also reported to be helpful in cases of postchildbirth anemia and in lung diseases, e.g., asthma and chronic cough.

Crickets, Acheta domestica. (Orhoptera, Gryllidae). Crickets legs were prepared like those of grasshoppers and were employed as a diuretic for dropsy (edema) (Barajas 1952; Conconi 1982; De Asis 1982).

Bugs., (Hemiptera Pentatomidae) Euchistus spp., Edessa spp., Atizies sp. and (Stink bugs), (Hemiptera, Coreidae), Acanthocephala spp., (Leaf-footed bugs) ***(Xomitl-Jumiles** in Nahuatl).* The oil of the bugs obtained in these four taxa was applied externally in treating Scrofula and other tubercular diseases and was also used for kidney, liver, and stomach ailments. When alive, these bugs are a powerful analgesic and anaesthetic against toothache and rheumatic and arthritic pain or to alleviate gastrointestinal diseases.

It was also used to treat goiter and was recommended for those with a weak constitution and as an aphrodisiac (Ancona 1933; De Asis 1982; Taylor 1975). Contemporary people of rural areas in the State of Guerrero use them against Bocio disease, perhaps because of the large amount of iodine they contain.

Xamues, Pachilis gigas. (Leaf-footed bugs). These insects were roasted and powdered and utilized in whooping cough cases (Meza 1979), eating the entire body. This could be because of their nutritional value and the quantity of vitamins they contain.

Mealybugs, Coccus axin. (Homoptera coccidae). Known as ''Aje,'' mealybugs can be considered a multi-purpose medicinal and useful insect. In addition to their use as an ointment (Jenkins 1964), varnish, or perfume, whole insect bodies were boiled to produce a sticky mass which was placed over lesions of leprosy and other skin conditions and to treat muscular pain, chronic itching, mange burn, or scars. It aids in the healing of burns through reducing excessive swelling and inflammation and thus is said to be helpful in heat strokes and diseases of fluid imbalance such as dropsy. The mass of boiled mealybugs was sometimes ingested to alleviate the affects of poisonous mushrooms and other fungi, or diarrhea and to clean the teeth (Herrera 1871). *Dactylopius coccus,* known as ''grana'' mealybug, is mostly used as an agent to color or redden tissue or foods. It, too, can be boiled to produce a sticky mass and used, as discussed above, as a skin treatment, a tooth powder to clean teeth and in the treatment of caries (Lopez 1971; Mexa 1979).

Beetles, Coleoptera, Meloidea, Buprestidae. Derived from the Nahuatl ***Tetl*** (fire) and ***Ocuillin*** (worm), several species have been used in Mexico as an aphrodisiac in a manner similar to that of the well-known Spanish fly *(Lytta vesicatoria).* Larvae of these beetles are roasted or crushed, mixed with water then drunk to treat urogenital disorders. It is equally well-known as a stimulant (love potion) for lovers (Asis 1982; Meza 1979; Robelo 1904).

Tlalomitl, a corruption of the Nahuatl ***Tlalli*** (bone) and ***Omitl*** (worm), are actually larvae of several species in the Elateridae. Before being eaten alive or roasted (Lopez 1972), they are hard, rigid and worm-like in appearance. They never bend and are used to alleviate impotence in men and are said to strengthen a faint penis. One species, *Strategus julianus, (Scarabeidae, Dynastinae)* known as a little bullfight because the male has three horns on its head, is prepared as a drink to increase sexual performance (Hernandez 1959).

Butterflies, Lepidoptera. ''Meocuilin'' is the common name for *Aegiale (Acentrocneme) hesperiaris, (Megathymidae),* the white agave worm. It comes from the Nahuatl terms ***Metl*** (Agave) and ***Ocuilin*** (worm). Having an appearance of white worms, they are eaten alive for their reputed aphrodisiac properties as well as for stomach disorders and rheumatic diseases.

Phasus spp. (Hepialidae), known as ''gusanillo'' (little worm), are said to have aphrodisiac properties. In Oaxaca, Veracruz and Chiapas states where it is eaten alive or roasted, it is used against gastrointestinal diseases such as dysentery, especially in children (Conconi 1982). Also, in rural areas it is used as an ointment for cracked lips or for dry skin.

Bombyx mori (Bombycidae). The boiled larvae were used in a variety of ailments, e.g.,

apoplexy, aphasy, bronchitis or pneumonia, and convulsions. The boiled pupae were used to treat hemorrhages and to alleviate polyuria or frequent urination. Excrements of the pupae are eaten to alleviate vomiting and diarrhea brought on by cholera, and to improve circulation.

Hymenoptera, several species of ants (Formicidae). Honey ants, *Myrmecosistus* spp. or ***necauzcatl,*** derived from the Nahuatl terms for ***Necu*** (honey) and ***azcatl*** (ants), are important because of the healing qualities of its honey. Produced and stored in the bodies of certain classes of the worker caste of these ants, the honey was fermented and drunk for its anti-inflammatory and anti-fever properties. The honey was also applied directly as a pomade for eye diseases, cataracts or growths over the iris called pterigions. The fermented drink was considered a sacred drink in religious ceremonies among many cultures, e.g., the Aztecs and Toltecs (Brygoo 1946; Kunckell de Herculais 1885-1886).

The mandibles of worker caste adults *Atta* spp. were used after surgery to close wounds. Several ants were positioned so their bites would pierce the skin on either side of the wound. The heads were then separated with the mandibles acting as sutures. Secretions from the salivary glands were reputed to have antibiotic properties, preventing infections.

Pogonomymex sp. The venom of these ants was used to cure rheumatic diseases. Ants were positioned on the afflicted part of the body, and allowed to sting. The venom penetrated directly into the bloodstream and in this respect resembled an intramuscular injection. Its efficacy in treating rheumatism, arthritis, and poliomyelitis is related to its immunological reaction. Even today in rural areas of Mexico with arid zones, this ant is used with the same purpose.

Bees, (Apidae) several species in three genera of Apidae. Melipona spp. The bees in this genus were so important to the Maya that they created a god, named A Much Keba, for them. The Maya prepared a sacred drink (''Balche'') from the honey. It was also known as ''Water of Youth.'' After fermentation, the honey was drunk and used against internal parasites such as intestinal worms (Favre 1968).

Trigona sp. The honey produced by this species was known as ''virgin honey.'' It was used (and still is in Huejutla, Hidalgo) for regulating menstruation, decreasing post-childbirth aches, and as a health restorative in the elderly.

Apis mellifera, the well-known honey bee, produces abundant honey which was and is applied to the skin for such conditions as excessive scar tissue, rash, and burns. In addition, it was prepared as a plaster or poultice for eye infections. It was consumed as a food supplement, for digestive problems, and as a general health restorative. When heated, it was taken for head colds, catarrh, cough, throat infections, laryngitis, tuberculosis, and lung diseases.

The venom of honey bees has, for more than a century, been utilized intramuscularly through direct stings of live bees to the part of the body afflicted by arthritis, rheumatism, and polineuritis. The frequency, dosage and duration of the treatment varies according to the disease and degree of development, for example, arthritic pain requires large dosages while asthma needs only a small one. Venom is gathered from both snakes and bees in much the same way; it is prepared in different concentrations and applied by injection. However it is necessary to know before-hand if the patient is allergic because this preparation is a powerful medicine (Partheniu 1981).

Propolis is a resinous, adhesive substance elaborated by bees to serve as a cementing material. It is often deposited on the buds of trees and other plant surfaces. The substance is now known to contain many hormones and, together with enzymes from bee saliva is thought to have antibiotic, bactericidal, and bacteriostatic properties. It can be employed as an anaesthetic and for all kinds of inflammations, even those resulting from tumors (Donadieu 1980).

Royal jelly is a white gelatinous product derived from pharingeal glands of worker bees of 5 to 14 days of age. The ancient Mexicans used it to re-establish healthy conditions in cases of anaemia. Today it is ingested in very small quantities when it is pure or in capsules or spoon if diluted, and is used for the following diseases: asthenia, anorexia, gastrointestinal ulcers, arteriosclerosis, anaemia, hypo- or hypertension, neurasthenia or inhibition of sexual libido (Donadieu 1979).

Pollen is the male gametophyte of flowers of plants. The pollen of many species is collected by bees and is referred to as "bee pollen." It is reputed to be a general health restorative and to be useful in treating internal and external infections by ingesting it.

Today these products are available in tablet or capsule form through the health food and wholistic health industries. Certain clinics and hospitals which have "Apitherapy" programs use these products by physiotherapy, ionizations, inhalations, electrophoresis and other treatments (Pochinkova 1981).

Wasps, Vespidae. Three species in three genera were studied. *Polistes instabilis,* known as "guitarre wasps," roasted or boiled or eaten alive are used to cure nervous breakdowns (Conconi 1982). Although this wasp has a powerful venom, people, usually women of menopause age, ate their brood. It could be the quantity of hormones immature stages of insects contain, steroid type compounds and/or by their high nutritive value, or the quantity and quality of their proteins that help in this physiological change of woman. Today in all Pacific coast areas of Mexico, especially in Oaxaca State, rural folks use them for the same purpose.

Polybia occidentalis nigratella. The little black wasp are used in the case of urinary diseases (Conconi 1982). The people of Tlaxiaco, Oaxaca eat the brood alive directly from the hive.

Brachygastra mellifica, known as "Castilla hive" in the state of Oaxaca or "Panal de Olla" in Hidalgo, is used for such eye diseases as cataracts or cloud formation. Two or three drops of this honey is applied to the eye daily and then the eye is to remain closed for a half an hour.

DISCUSSION

As is often the case with other forms—either plant or animal—which have been used in empirical medicine, the use of insects seems to be allied with the Doctrine of Signatures, which is based upon a complete or partial resemblance between the plant or animal and the specific organ or part of the human body or bodily function which it is capable of healing, e.g., the femur of the last leg of grasshoppers, that are similar in shape to the bladder and is used for urinary diseases, or the resemblance of the penis of the certain insect larvae and their use to alleviate impotence in men.

Some species of insects had, and still have, demonstrated medicinal value. These species undoubtedly contain biodynamic compounds or principles which are capable

of effecting physiological or other changes in the human body, eg., the iodine content of jumiles bugs used against bocio; the effect of the bee venom over the inflammation of articulations; of honey bee in the treatment of respiratory diseases; the effect of antibiotic substances in the salivary glands of *Atta,* ants that promote healing of wounds; or the re-establishment a healthy condition in women of menopause age because of the hormone content of immature stages of insects. Side effects are thought to be minimal if medicinal plants or animals are properly prepared and administered, but this has received little attention. If the true role of medicinal insects is known in the traditional medicine of an indigenous group—knowledge based upon observation and experiences of medicine men—these organisms, and the active principles within them, can more effectively be evaluated as prototype drugs.

Bees were emphasized not only because venom may be effective for treating certain conditions (although this seems more directly associated with wasps), but also because of the several medicinal products from them. These are now available in pharmacies, health food stores, and wholistic health outlets under commercial names such as Melitin, Oftalmosept, Apinen, Apicosan, Apiuroset, etc.

Finally, it is well to mention again that insects have played an important role in the traditional medicine of a number of indigenous groups in Mexico, eg., the Nahuas, Mazahuas, Mixtecas, Zapotecos, Mayas, Otomies, Olmecas, etc. and may prove a valuable source of prototype drugs.

CONCLUSIONS

For the first time, a group of insects with a medical use was taxonomically classified and scientific names were provided. The review included former classifications dated before and after the Conquest. This field of investigation provides a promising research topic due to the importance to man in various fields (eg., ethnobiology, medicine, pharmaceutical, etc.) and because of its historical significance.

ACKNOWLEDGEMENTS

We want to express our gratitude to Drs. W. Van Asdall and Margarita Kay of the University of Arizona, Tucson and to Dr. R. Bye of Botanical Gardens (UNAM MEXICO) for their help in the translation and suggestions to this manuscript.

APPENDIX 1

TAXONOMIC RELATION OF THE INSECTS UTILIZED IN THE EMPIRICAL MEDICINE BY THE ANCIENT MEXICANS.

Order	Family	Species		Common Name
Orthoptera	Acrididae	*Sphenarium*	*purpurascens* Ch.	[Grasshoppers]
		Sphenarium	*histrio* G.	(Chapulines)
		Sphenarium	*magnum* M.	(Chapulines)
		Melanoplus	*mexicanus*	(Chapulines)
		Taeniopoda	*sp.*	(Chapulines)
		Schistocerca	*sp.*	[Locusts]
		Schistocerca	*paranensis* B.	(Langostas)

TAXONOMIC RELATION OF THE INSECTS UTILIZED IN THE EMPIRICAL MEDICINE BY THE ANCIENT MEXICANS.

Order	Family		Species	Common Name
	Gryllidae	*Gryllus (Acheta)*	*domesticus* L.	[Crickets] (Grillos)
Hemiptera	Pentatomidae	*Euchistus*	*strennus* D.	[Stink bugs] (Jumiles)
		Euchistus	*egglestoni* R.	[Stink bugs] (Jumiles)
		Euchistus	*crenator* S.	[Stink bugs] (Jumiles)
		Euchistus	*lineatus* W.	[Stink bugs] (Jumiles)
		Atizies	*taxcoensis* A.	[Stink bugs] (Jumiles)
		Edessa	*petersii* D.	[Stink bugs] (Jumiles)
	Coreidae	*Acantocephala*	*declivis* S.	[Leaf-footed] bugs
		Acantocephala	sp.	[Leaf-footed] bugs
		Pachilis	*gigas* B.	Xamoes [Mealybugs]
	Margarodidae	*Coccus (Llavea)*	*axin* de la LL.	Axim, Axe, Aje, Aji, Age
	Dactylopidae	*Dactylopius*	*coccus* C.	"Cochinilla de la grana"
		Datylopius	*indicus* Gr.	"Cochinilla de la grana"
		Datylopius	*confusus* Cock.	"Cochinilla de la grana"
		Dactylopius	*tomentosus* L.	"Cochinilla de la grana"
Coleoptera	Buprestidae	*Thrincopyge*	*alacris* Le Conte	[Worms] Teocuilin
		Chrysobothris	*basalis*	[Worms] Teocuilin
	Meloidae	*Meloe*	sp.	Tlaxiquipillin
	Scarabaeidae	*Strategus*	*julianus* B.	Temoli
		Canthon	*sp.*	Escarabajos estiercoleros
		Copris sp.	*sp.*	Escarabajos estiercoleros
	Elateridae			Tlalomitl
Lepidoptera	Megathymidae	*Aegiale (Acentrocneme)*	*hesperiaris* K.	Gusano blanco de maguey
	Hepialidae	*Phasus*	sp.	"Gusanillo"
	Bombycidae	*Bombyx*	*mori* L.	Gusano de seda [Ants]
Hymenoptera	Formicidae	*Myrmecosistus*	*melliger* W.	Honey ants
		Mymecosistus	*mexicanus* W.	Honey ants
		Atta	*cephalotes* L.	Gardening ants
		Atta	*mexicana* S.	Gardening ants
		Pogonomyrmex	*barbatus*	Harvesting ants
	Apidae	*Apis*	*mellifera* L.	[Bees]
		Trigona	sp.	Stingless bees

TAXONOMIC RELATION OF THE INSECTS UTILIZED IN THE EMPIRICAL MEDICINE BY THE ANCIENT MEXICANS.

Order	Family		Species	Common Name
		Melipona	*beeckei* B.	Stingless bees
	Vespidae	*Polybia*	*occidentalis*	[Wasps]
			nigratella B.	Black Wasp
		Polistes	*instabilis* S.	Yellow jacket
		Brachygastra	*mellifica* S.	Castilla Hive

LITERATURE CITED

AGUIRRE, B.G. 1947. La medicina indígena, América Indígena, VII N°2 107-127.

ANCONA, L. 1933. Los jumiles de Cuautla, An. Inst. de Biol. UNAM, 4:103-108.

BARAJAS, C.L.E. 1951. Los Animales usados en la medicina popular mexicana. Tésis Prof. Fac. de Ciencias, UNAM.

BRYGOO, E. 1946. Essai de Bromatologie Entomologique. Les Insectes Comestibles These Doctorat, Bergerac. 233 p.

CLAVIJERO, F.J. 1880. General History of Things of New Spain, Paris, 320 p.

CONCONI, J.R.E. de 1982. Los insectos como una fuente de proteinas en el futuro. Ed. Limusa México, 142 p.

DE ASIS, F. y T. 1982. Historia de la Medicina en México. Ed. Fascimilar, IMSS IV Vols. 2819 p.

DONADIEU. 1979. La jalea real terapeútica natural, 3a. Ed. Paris, 32 p.

_____. 1980. La propolis terapeútica natural. Ed. Malonine, S.A. Paris, 47 p.

F.A.O. 1973. Energy and Protein requirements, FAO Nutrition meetings, Report Series N°52 Food and Agriculture Organization, Rome, 12 p.

FAVRE, H. 1968. Historie, Ethnographie et folklore, Traité de Biologie de L'Abeille. Mason Ed. Paris, 978 p.

HERNANDEZ, F. 1959. Obras Completas Historia Natural de la Nueva Espana, Vol. II. Tratado Cuarto, p. 384-395.

HERRERA, A. 1871. "Aje." Gaceta Medica:6 N°23:283-284.

JENKINS, J.K. 1964. Aje or ni-in (The fat of a scale insect), painting medium and unguent. XXXV. Congreso Internacional de Americanistas (1962). Mexico, p. 625-636.

KUNCKELL DE HERCULAIS. 1885-1886. Observaciones de la Hormiga de miel *(Myrmecosisus melliger)*. La Naturaleza, VII:1-10. Trad. de A. Herrera.

LOPEZ, A.A. 1971. De las plantas medicinales y de otras cosas medicinales. Est. de Cultura nahuatl IX:125-230.

LOPEZ, A. 1972. Textos acerca de las partes del cuerpo humano y de las enfermedades y medicinas de las primeras memorias de Sahagun. Est. de Cultura Nahuatl IX:135-230.

MEZA, C. 1979. La utilización de los insectos en la farmacopea mexicana. Tésis Prof. Fac. de Ciencias, UNAM, 67 p.

PARTHENIU, A. 1981. El veneno de abejas y la dinámica informacional normal y patológica del organismo humano. XXVIII Congreso Internal. Apicultura 105-106 p.

POCHINKOVA, A. 1981. Métodos Fisioterapeúticos en la Apiterapia. XXVIII Congreso Internal. Apicultura p. 108.

ROBELO, C.A. 1904. Diccionario de Aztequismos, Mexico. 708 p.

SAHAGUN, F.B. de 1980. Códice Florentino Ed. Fascimilar Ed. Archivo General de la Nacion, Libro XI. p. 221-261.

TAYLOR, R. 1975. Butterflies in my stomach or insects in human nutrition. Woodbridge Press Publishing Co., California, p. 135.